High Sensitivity, High Frequency Sensors for Hypervelocity Testing and Analysis, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

This NASA Phase I SBIR program would develop high sensitivity, high frequency nanomembrane (NM) based surface sensors for hypervelocity testing and analysis on wind tunnel models as well as operational aerospace vehicles, using SOI NM techniques in combination with our pioneering HybridSil ceramic nanocomposite materials. Such low-modulus, conformal nanomembrane sensor skins with integrated interconnect elements and electronic devices can be applied to new or existing propulsion systems for high frequency surface pressure analysis. During this program, large continuous NMs of single crystal Si, SiGe and Ge will be readily released from the engineered wafers using wet chemical etching and transferred to flexible substrates to form multi-axis surface pressure sensors and arrays. Sensors may be connected to external support instrumentation either through thin film and ribbon cable interconnects, or potentially wirelessly using RF communication directly from electronic networks incorporated into the sensor skin material.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: The anticipated initial market of the NM high frequency surface sensors is for hypersonic wind tunnel testing of flow models as well as in measurements of turbine engines. An appreciation of the instrumentation issues obtained by working with NASA centers would allow improvements in sensor materials, electronics and packaging, and potentially allow the transition of related products to operational vehicles.
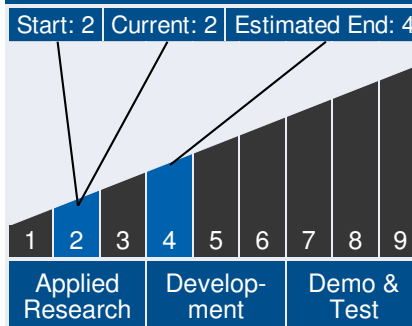
To the commercial space industry:

Potential Non-NASA Commercial Applications: Primary customers would be university, government laboratory and aerospace industry researchers. The thin film high frequency pressure sensor elements may be used as air flow or water flow

SPACE TECHNOLOGY

Image Not Available

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Technology Maturity

Start: 2 | Current: 2 | Estimated End: 4

1	2	3	4	5	6	7	8	9
Applied Research			Development			Demo & Test		

Management Team

Program Executives:
- Joseph Grant
- Laguduva Kubendran

Program Manager:
- Carlos Torrez

Continued on following page.

High Sensitivity, High Frequency Sensors for Hypervelocity Testing and Analysis, Phase I Project

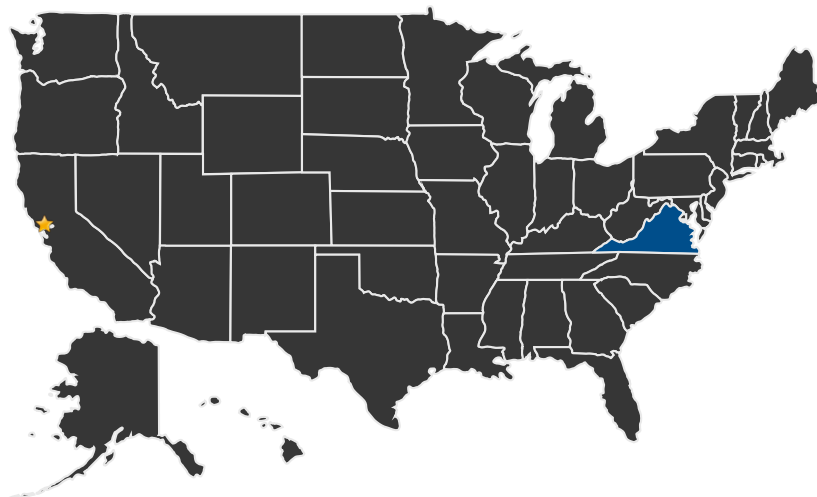SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

devices in systems where either the low weight, low surface profile, lack of need for space below the flow surface, or high sensitivity at a low cost are needed.

U.S. WORK LOCATIONS AND KEY PARTNERS

■ U.S. States With Work

★ **Lead Center:**
Ames Research Center

Other Organizations Performing Work:

- Nanosonic, Inc. (Pembroke, VA)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23268)

Management Team *(cont.)*

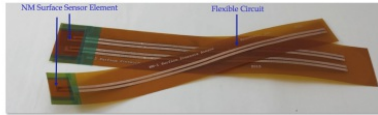**Principal Investigator:**
- Hang Ruan

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IMAGE GALLERY

High Sensitivity, High Frequency Sensors for Hypervelocity Testing and Analysis, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

High Sensitivity, High Frequency Sensors for Hypervelocity Testing and Analysis, Phase I

Potential Applications

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